

Bellwork: 3/21/13

Multiply and Simplify the rational expressions below:

$$\frac{2x^2-5x-12}{x^2+2x-24} \cdot \frac{x^2-36}{4x+6}$$

$$(2x^2-8x)(3x-12)$$

$$\frac{(2x+3)(x-4)}{(x+6)(x-4)} \cdot \frac{(x-6)(x+6)}{2(2x+3)}$$

$$\frac{(x-6)}{2}$$

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$$9) \frac{(64-x^2)}{3x^2+x} \cdot \frac{3x}{x^2-64}$$

$$\frac{-(x^2-64)}{x(3x+1)} \cdot \frac{3x}{(x^2-64)}$$

$$\frac{-(x+8)(x-8)}{x(3x+1)} \cdot \frac{3x}{(x+8)(x-8)}$$

$$\frac{-3}{3x+1}$$

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$$\textcircled{10} \quad \frac{4x^2-9}{3x} \cdot \frac{9x^2-6x}{9-4x^2} =$$

$$\begin{aligned} & \frac{\cancel{4x^2}-9}{3x} \cdot \frac{3x(3x-2)}{\cancel{4x^2}-9} \\ & \frac{(2x+3)(2x-3)}{3x} \cdot \frac{3x(3x-2)}{-(2x+3)(2x-3)} = \frac{3x-2}{-1} \\ & = -1(3x-2) \text{ or } -3x+2 \end{aligned}$$

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DIVIDING RATIONAL EXPRESSIONS

Divide:

$$\begin{aligned} 1) \quad \frac{3}{5} \div \frac{7}{2} &= \frac{3}{5} \cdot \frac{2}{7} = \frac{6}{35} \\ 2) \quad \frac{3}{5} \div \frac{4}{10} &= \frac{3}{5} \cdot \frac{10}{4} = \frac{6}{2} = 3 \end{aligned}$$

Both rational numbers and rational expressions are divided the same way:

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc} \quad \text{where } b, c, \text{ and } d \neq 0$$

Never mind the reason why, just ...

Example 1: $\frac{5x}{4y} \div \frac{2x}{3y^2} = \frac{5x}{4y} \cdot \frac{3y^2}{2x} = \frac{15y}{8}$

Example 2: $\frac{x}{x+3} \div \frac{2x}{(x+2)(x+3)} = \frac{x}{x+3} \cdot \frac{(x+2)(x+3)}{2x} = \frac{(x+2)}{2}$

Example 3: $\frac{x^2-4}{x+3} \div \frac{x^2-4x+4}{x^2+3x} = \frac{x^2-4}{x+3} \cdot \frac{x^2+3x}{x^2-4x+4} = \frac{(x+2)(x-2)x(x+3)}{(x+3)(x-2)(x-2)} = \frac{x(x+2)}{x-2}$

Example 4: $\frac{\frac{x^2-4}{2-x}}{\frac{2-x}{4}} = \frac{x^2-4}{2-x} \div \frac{2-x}{4} = \frac{x^2-4}{2-x} \cdot \frac{4}{2-x} = \frac{(x+2)(x-2) \cdot 4}{1 \cdot (x-2)} = \frac{4(x+2)}{1} = 4(x+2)$

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$$\textcircled{5} \frac{x^2 - 2x - 8}{4x^2 + 8x} \div \frac{x^2 + x - 20}{1}$$

$$\frac{x^2 - 2x - 8}{4x^2 + 8x} \cdot \frac{1}{x^2 + x - 20} = \frac{\cancel{(x+2)}\cancel{(x-4)}}{4x\cancel{(x+2)}(x+5)\cancel{(x-4)}} \cdot \frac{1}{1}$$
$$= \frac{1}{4x(x+5)}$$

